

## CLAIMS

What is claimed is:

1. A method for bridging brief power outages in a matrix converter with a plurality of power input side commutation capacitors and a power input side switching unit, the method comprising the steps of:  
  
in the event of a detected power outage, immediately disconnecting the matrix converter from the power supply, so that the matrix converter operates in a buffer operating mode;  
  
controlling the matrix converter in the buffer operating mode so as to generate at an input of the matrix converter an actual capacitor voltage space vector with a predetermined amplitude and phase angle;  
  
when the line power is reestablished, tracking the created actual capacitor voltage space vector during a synchronization phase with respect to a measured actual power line voltage space vector until the actual capacitor voltage space vector and the actual power line voltage space vector coincide; and  
  
reconnecting the matrix converter to the power supply.
2. The method of claim 1, and further comprising the step of presetting a reactive current control variable for a normal operating mode, a buffer operating mode, and a synchronization operating mode of the matrix converter.

3. The method of claim 1, wherein brief power outages are bridged in several matrix converters, with each matrix converter being operatively connected to a corresponding drive having a current reference value, and further comprising the step of generating a reactive current control variable for each drive that is weighted with the corresponding current reference value.
4. The method of claim 1, and further comprising the steps of forming from capacitor voltages, which are measured across the plurality of power input side commutation capacitors, two orthogonal voltage components of an actual capacitor voltage space vector, and smoothing the phase angle of the actual capacitor voltage space vector based on a nominal value of a power line frequency to determine from the two orthogonal voltage components the amplitude and phase angle of the actual capacitor voltage space vector.

5. The method of claim 1, and further comprising the steps of forming from measured phase voltages two orthogonal voltage components of an actual power line voltage space vector, transforming the orthogonal voltage components into polar components having an amplitude and phase angle, comparing the amplitude of the actual power line voltage space vector with a nominal amplitude value and evaluating a detected amplitude deviation for switching from a normal operating mode to a buffer operating mode and from the buffer operating mode to a synchronizing operating mode, and smoothing the phase angle of the actual power line voltage space vector with a nominal value of the power line frequency.
6. The method of claim 1, wherein the matrix converter is reconnected to the power supply depending on a detected amplitude deviation between the amplitude of the actual capacitor voltage space vector and the amplitude of the actual power line voltage space vector, and depending on a detected phase angle deviation between the phase angle of the actual capacitor voltage space vector and the phase angle of the actual power line voltage space vector, and further comprising the step of changing from the synchronizing operating mode to a normal operating mode.

7. The method of claim 5, and further comprising the steps of defining pre-control values for amplitude and phase components of a nominal capacitor voltage space vector, and controlling the actual capacitor voltage space vector to the nominal capacitor voltage space vector.
8. The method of claim 7, wherein the pre-control value for controlling the amplitude component of the actual capacitor voltage space vector corresponds to an expected dissipated power of the matrix converter.
9. The method of claim 7, wherein the pre-control value for controlling the phase angle component of the actual capacitor voltage space vector corresponds to an expected reactive current of an actual power line current space vector.
10. The method of claim 1, and further comprising the steps of comparing an amplitude of the actual power line voltage space vector with an upper and a lower tolerance limit value, and switching from a synchronizing operating mode to a buffer operating mode and from a normal operating mode to a normal operating mode when the amplitude of the actual power line voltage space vector is greater than the upper tolerance limit value or smaller than the lower tolerance limit value.

11. A device for bridging brief power outages in a matrix converter, wherein the matrix converter includes a controller, a plurality of power input side commutation capacitors and a power input side switching unit, said device comprising:

a first unit for measuring an actual capacitor voltage space vector;

a second unit for measuring an actual power line voltage space vector, said second unit connected with two control inputs of the controller of the matrix converter;

a plurality of switches;

a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with an amplitude output of the second unit, and an output which is connected via a first of the plurality of switches with a setpoint input of the controller of the matrix converter;

a phase angle control circuit having an input connected with corresponding phase angle outputs of the first and second unit, and an output connected via a second switch with a third control input of the controller of the matrix converter;

a power line voltage monitoring device having an input which is connected with an amplitude output of the second unit; and

a sequence controller having an input which is connected with a deviation output of the voltage control circuit, of the phase control circuit and of the power line voltage monitoring device, and an output which is connected with

a control input of the plurality of switches and with a control input of the switching unit.

12. The device of claim 11, and further comprising a vector phase control circuit connected with the outputs of the phase outputs of the first and second units.
13. The device of claim 12, wherein the output of the second switch is connected with a frequency input of the vector phase control circuit, with the phase angle input of the vector phase control circuit being connected with the phase angle output of the first unit.
14. The device of claim 11, wherein the first unit comprises a coordinate transformer with a vector rotator connected downstream of the coordinate transformer.
15. The device of claim 11, wherein the second unit comprises two coordinate converters connected in series.
16. The device of claim 11, and further comprising a smoothing device connected downstream of the amplitude output of the first unit.

17. The device of claim 11, and further comprising a vector phase control circuit connected downstream of the phase angle output of the second unit.
18. The device of claim 11, wherein the voltage control circuit further comprises a comparator with a regulator connected downstream of the comparator.
19. The device of claim 11, wherein the phase angle control circuit further comprises a comparator with a regulator connected downstream of the comparator.
20. The device of claim 11, and further comprising a comparator connected to an input of the phase angle control circuit and a regulator connected downstream of the phase angle control circuit, with a first input of the regulator connected to an output of the comparator through a third of the plurality of switches and a second input of the regulator connected to the phase angle error output of the second unit.
21. The device of claim 11 in the form of a signal processor.

22. A device for bridging brief power outages in a matrix converter, wherein the matrix converter includes a controller, a plurality of power input side commutation capacitors and a power input side switching unit, the device comprising:

a first unit for measuring an actual capacitor voltage space vector;

a second unit for measuring an actual power line voltage space vector, said second unit connected with two control inputs of the controller of the matrix converter;

a plurality of switches;

a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with an amplitude output of the second unit, and an output which is connected via a first of the plurality of switches with a setpoint input of the controller of the matrix converter;

a phase angle comparator having an input connected with corresponding phase angle outputs of the first and second units, and an output connected with a control input of the controller of the matrix converter;

a power line voltage monitoring device connected with an amplitude output of the second unit;

a sequence controller having an input which is connected with a deviation output of the voltage control circuit, of the power line voltage monitoring device and of the phase angle comparator, and an output which is connected with a control input of the plurality of switches and with a control



input of the switching unit,

wherein a control variable is applied to inputs of a second and third of the plurality of switches, and wherein an output of the third switch, the amplitude output and phase angle output of the first unit are each connected with additional control inputs of the controller of the matrix converter.

23. The device of claim 22, and further comprising a vector phase control circuit connected with the outputs of the phase outputs of the first and second units.
24. The device of claim 23, wherein the output of the second switch is connected with a frequency input of the vector phase control circuit, with the phase angle input of the vector phase control circuit being connected with the phase angle output of the first unit.
25. The device of claim 22, wherein the first unit comprises a coordinate transformer with a vector rotator connected downstream of the coordinate transformer.
26. The device of claim 22, wherein the second unit comprises two coordinate converters connected in series.

27. The device of claim 22, and further comprising a smoothing device connected downstream of the amplitude output of the first unit.
28. The device of claim 22, and further comprising a vector phase control circuit connected downstream of the phase angle output of the second unit.
29. The device of claim 22, wherein the voltage control circuit further comprises a comparator with a regulator connected downstream of the comparator.
30. The device of claim 22, in the form of a signal processor.
31. A controller for a matrix converter capable of bridging brief power outages, comprising:
  - a plurality of power input side commutation capacitors,
  - a power input side switching unit connected between the power supply and the commutation capacitors,
  - a first unit for measuring an actual capacitor voltage space vector;
  - a second unit for measuring an actual power line voltage space vector, said second unit connected with two control inputs of the controller of the matrix converter;
  - a plurality of switches;
  - a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with

an amplitude output of the second unit, and an output which is connected via a first of the plurality of switches with a setpoint input of the controller of the matrix converter;

a phase angle control circuit having an input connected with corresponding phase angle outputs of the first and second unit, and an output connected via a second switch with a third control input of the controller of the matrix converter;

a power line voltage monitoring device having an input which is connected with an amplitude output of the second unit; and

a sequence controller having an input which is connected with a deviation output of the voltage control circuit, of the phase control circuit and of the power line voltage monitoring device, and an output which is connected with a control input of the plurality of switches and with a control input of the switching unit.

32. A controller for a matrix converter capable of bridging brief power outages, comprising:

a plurality of power input side commutation capacitors,

a power input side switching unit connected between the power supply and the commutation capacitors,

a first unit for measuring an actual capacitor voltage space vector;

a second unit for measuring an actual power line voltage space vector, said second unit connected with two control inputs of the controller of the matrix

converter;

a plurality of switches;

a voltage control circuit having an input which is connected with an amplitude output of the first unit and another input which is connected with an amplitude output of the second unit, and an output which is connected via a first of the plurality of switches with a setpoint input of the controller of the matrix converter;

a phase angle comparator having an input connected with corresponding phase angle outputs of the first and second units, and an output connected with a control input of the controller of the matrix converter;

a power line voltage monitoring device connected with an amplitude output of the second unit;

a sequence controller having an input which is connected with a deviation output of the voltage control circuit, of the power line voltage monitoring device and of the phase angle comparator, and an output which is connected with a control input of the plurality of switches and with a control input of the switching unit,

wherein a control variable is applied to inputs of a second and third of the plurality of switches, and wherein an output of the third switch, the amplitude output and phase angle output of the first unit are each connected with additional control inputs of the controller of the matrix converter.